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A new soft coral genus (Coelenterata: Octocorallia) from Palau

PHILIP ALDERSLADE

Museum and Art Gallery of the Northern Territory,
GPO Box 4646, Darwin, NT 0801, AUSTRALIA
phil.alderslade@nt.gov.au

ABSTRACT

Elbeenus lauramartinae, a new genus and species of the soft coral family Alcyoniidae from deep (159 m) water off Palau is described. The lobed colonies bear a resemblance to some species of *Sinularia* or *Klyxum*, but unlike these genera the coenenchymal sclerites consist of large interior spindles only. Colonies have very large polyps armed with large collaret and points sclerites that are characteristic of some species of the Nephtheidae and Nidaliidae.

KEYWORDS: new genus, new species, soft coral, Coelenterata, Cnidaria, Octocorallia, Alcyoniidae, Palau.

INTRODUCTION

The new genus and new species, which are the subject of this paper, was collected by the Coral Reef Research Foundation (CRRF), which is based in Palau. The CRRF is contracted to the American National Cancer Institute to collect marine invertebrates in regions of the Indian and Pacific Oceans for natural products research. It has been my fortune for a number of years to investigate their soft coral collections from localities as divergent as South Africa and American Samoa, and this is just one of many new octocoral taxa discovered by the CRRF's team of professionals.

The new genus is placed in the Alcyoniidae, but has some characters that suggest strong links with taxa currently included in the Nidaliidae, and somewhat lesser with the Nephthcidae.

The notation NTM represents the Museum and Art Gallery of the Northern Territory.

SYSTEMATICS

Family Alcyoniidae Lamouroux

Elbeenus n. gen.

Type species. *Elbeenus lauramartinae* new species, by original designation.

Diagnosis. Colonies with soft, flexible, branched lobes, extending from a base that may be made rigid in the lower-most regions by an outer layer of large spindles. Colony interior with wide gastric canals, and sparsely distributed large spindles that are often visible through the transparent surface of the lobes. Polyps large and retractile, armoured with a strong collaret and points arrangement. Tentacles with papillae on the oral face between the pinnule rows, and armoured with rods, often quite large, that, proximally, are basically arranged in two series. Colonies are azooxanthellate and sclerites are colourless.

Remarks. Although the morphology of colonies of species of Alcyoniidae may be unbranched (cigar- or carrot-like) or broadly encrusting (thick or membranous), in most there is a bare basal section (termed the stalk or trunk) and an upper, polyp-bearing part which may be flat or undulate, loosely pleated around the margin, or divided into lobes, ridges or short branches. Coenenchymal sclerites of alcyoniids include tuberculate or prickly spindles, clubs, 6- or 8-radiates, ovals and dumbbells, and the interior of a colony may appear compressible and jelly-like if the sclerite content is low, and rigid and solid if it is high. Calyces may be present and polyps may be small or large, and retractile or non-retractile.

The new genus clearly conforms to these criteria, and undoubtedly bears a considerable morphological resemblance to some species of *Sinularia* and *Klyxum*. It is worth noting, however, that although large polyps with a strong collaret and points arrangement are found in alcyoniids, for example *Eleutherobia* (Verseveldt and Bayer 1988), and although the restriction of the coenenchymal sclerites to spindles is found in the alcyoniid *Skamnarium* Alderslade, 2000, the occurrence of these two characteristics together is suggestive of genera in families other than Alcyoniidae. *Eleutherobia* and *Skamnarium* are easily distinguished from *Elbeenus* n. gen. The polyps of *Eleutherobia* generally have extremely large numbers of both point and collaret sclerites, the colonies are nearly always digitiform, and the coenenchymal sclerites are commonly 8-radiates and capstans, or derivatives of these. The only known species of *Skamnarium* forms pedestal-shaped colonies, and the polyps are small, confined to the flat or dished summit and are devoid of sclerites.

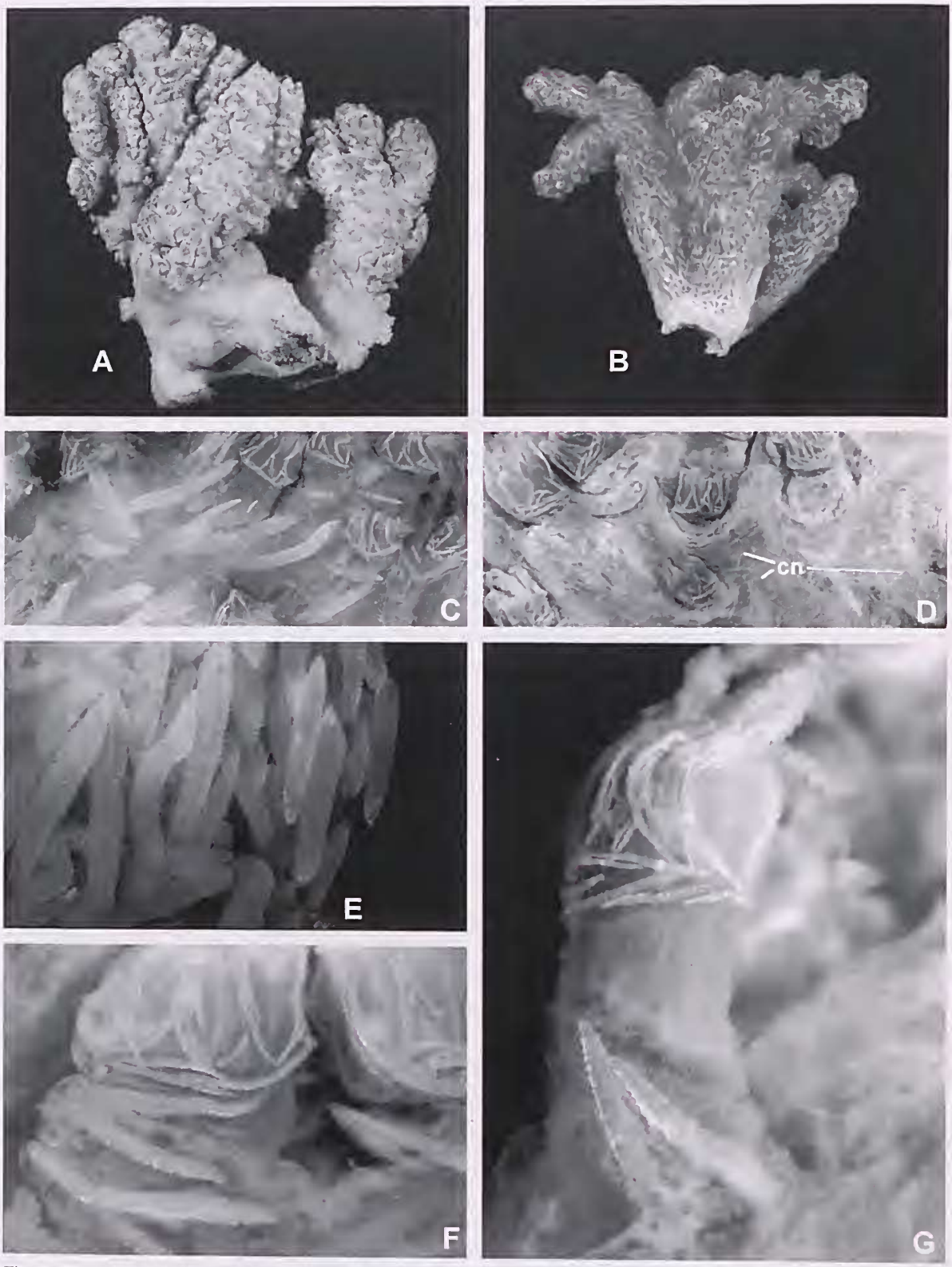

Fig. 1. *Elbeenus lauramartinae* n. gen., n. sp.: **A**, holotype (NTM C13108), life size; **B**, picture of lost colony, exact size unknown. **C–G**, holotype: **C**, **D**, lobe surface; **E**, base surface; **F**, **G**, interior sclerites protruding onto the surface below a polyp. Abbreviation: **cn** = subsurface canals.

Of the non-alcyoniid genera, there are only two that warrant comparison: *Scleronephthya* (Nephtheidae) and *Nephthyigorgia* (Nidaliidae) (see Fabricius and Alderslade 2001: 110, 132, for colour pictures and generic descriptions). Both have relatively large polyps with a collaret and points arrangement, and both (with the single exception of *Scleronephthya pustulosa* Wright and Studer, 1889) have only spindles in the coenenchyme. *Elbeenus* n. gen. can be clearly distinguished from these taxa because both have a dense covering of surface spindles over the whole colony. Although a rigid coating may occur in the basal region of *Elbeenus* n. gen, the extent of this may simply be a response to the nature of the substrate and local turbulence (see below). In addition to having a covering of surface sclerites, *Scleronephthya* has polyps with a very complex armature of clubs, spindles and tentacle scales, and *Nephthyigorgia* has prominent calyces.

Although the two non-alcyoniid genera are clearly distinguishable from *Elbeenus*, the aforementioned similarities bring into question the familial placement of all three genera. *Nephthyigorgia* Kükenthal, 1910 is presently grouped in the Nidaliidae (Kükenthal (1910) placed his new genus *Nephthyigorgia* in the Siphonogorgiidae, but the family was later called Nidaliidae (Utinomi 1958: 113–116)). The few genera in the Nidaliidae have several major characters in common: colony stiffness provided by large spindle-shaped sclerites, the presence of calyces, and relatively large, retractile, well-armoured polyps. There are two subfamilies: the Nidaliinae, which includes *Nephthyigorgia* and several other genera with species also shaped rather like some soft corals of other families; and the Siphonogorgiinae, which includes highly branched forms that look much like gorgonians. Both groups are characterised by the fact that the colonies are stiff, often brittle, because their outer walls are constructed of large, longitudinally arranged tuberculate spindles, surrounding the large canals of the primary polyps. In those species that resemble gorgonians, the branches, and often the stalk, do not have a medulla, are easily broken, and essentially consist of thickly packed spindles with a few, narrow, longitudinal canals in the centre. In contrast, the Nidaliinae includes small colonies that are unbranched and torch-like, or have small numbers of lobes or finger-like branches. In these, the outer wall of sclerites is thin and surrounds a gelatinous interior, with broad canals and few sclerites. I feel that in all probability the family will be shown to be polyphyletic, and that *Nephthyigorgia* and the other non-gorgonian-like nidaliid genera may be better placed in the Alcyoniidae. The alternative of placing *Elbeenus* n. gen. in the Nidaliidae would necessitate a radical change of that family's definition to allow the inclusion of soft bodied species. A more detailed discussion of the validity of this family grouping awaits the results of DNA work being carried out by Prof. C. McFadden, Hervey Mudd Institute, California, and her associates.

Given that the coenenchymal sclerite component of species of *Scleronephthya* is virtually all relatively large spindles, it has little in common with the sclerite component of the other genera in the Nephtheidae, which more commonly comprise prickly needles, leafy clubs, irregular shaped spiky forms, and tuberculate and thorny spindles often extensively ornamented along one side (Fabricius and Alderslade 2001). It appears the genus was placed in the Nephtheidae by Wright and Studer (1889), primarily because the growth form of the type species has polyps that do not retract into a calyx, and are clustered in groups on the terminal twigs. The latter indicating a characteristic canal system where a small number of broad primary polyp canals split into groups that extend up into the distal lobes and branches where they join with the polyp cavities. My research indicates that in many species, very large numbers of the polyps are often singly arranged on the stems and branches with little arrangement in groups, so indicating a canal system perhaps more akin to that found in the Alcyoniidae. Indeed, the Japanese species, *Alcyonium gracillimum* Kükenthal, 1906a, was recognised as an alcyoniid for nearly 100 years before being transferred to *Scleronephthya* (Alderslade 2000). Once again, a more detailed discussion awaits the results of Prof. McFadden's DNA research. Though it cannot be denied that live expanded colonies of the genus do have a general nephtheid aspect (Fabricius and Alderslade 2001: 104–125), *Scleronephthya* may eventually prove to have more in common with genera other than those in the Nephtheidae.

Etymology. A combination of letters – gender masculine.

Elbeenus lauramartinae n. sp.

(Figs 1-5)

Type material. HOLOTYPE - NTM C13108, western side of Uchelbeluu Reef, Koror, Palau, 07°16.41′N, 134°31.34′E, depth 159 m, 28 March 2001, coll. Laura Martin, aboard the *DeepWorker* submersible.

Description. The lobed colony, which branches more or less in one plane, is 74 mm tall, 69 mm across and about 30 mm at its thickest point (Fig. 1A). It consists of a short, rigid basal region producing two main stems that divide into finger-like lobes, some of which re-divide once or twice (it is probable that the smaller stem is a daughter colony that was in the process of separating from the larger parent). The lobes are very soft and flexible and bear numerous large polyps; most of which are exert and well spaced. The surface of the polypary is relatively transparent and a broad network of interconnecting canals (Fig. 1D) permeates just

underneath. These canals are often particularly wide and conspicuous in the region immediately below a protruding polyp. Some long, spindle-shaped sclerites can also be seen below the surface here and there (Fig. 1C, D), as well as some opaque polyp pharyngeal zones, and mesenteries together with their attached, spherical, reproductive products.

The common base, and the lower part of both main branches, are rigid due a surface layer of large spindles (Fig. 1E). Most lie in a more or less longitudinal direction, but they are criss-crossed in the most basal parts for extra strength. The surface of the lobes is, in general, free of sclerites, however, occasionally some interior sclerites protrude through, or actually occur on, the surface immediately below visible polyps (Fig. 1F, G). The latter is mostly restricted to the proximal region of the polypary and in a few cases the sclerites resemble a polyp support.

The spindles of the common base are up to 6.2 mm long and 0.9 mm wide, and may be straight or curved (Fig. 2C). They have large, rounded to cylindrical tubercles that are ornamented with short, jagged processes;

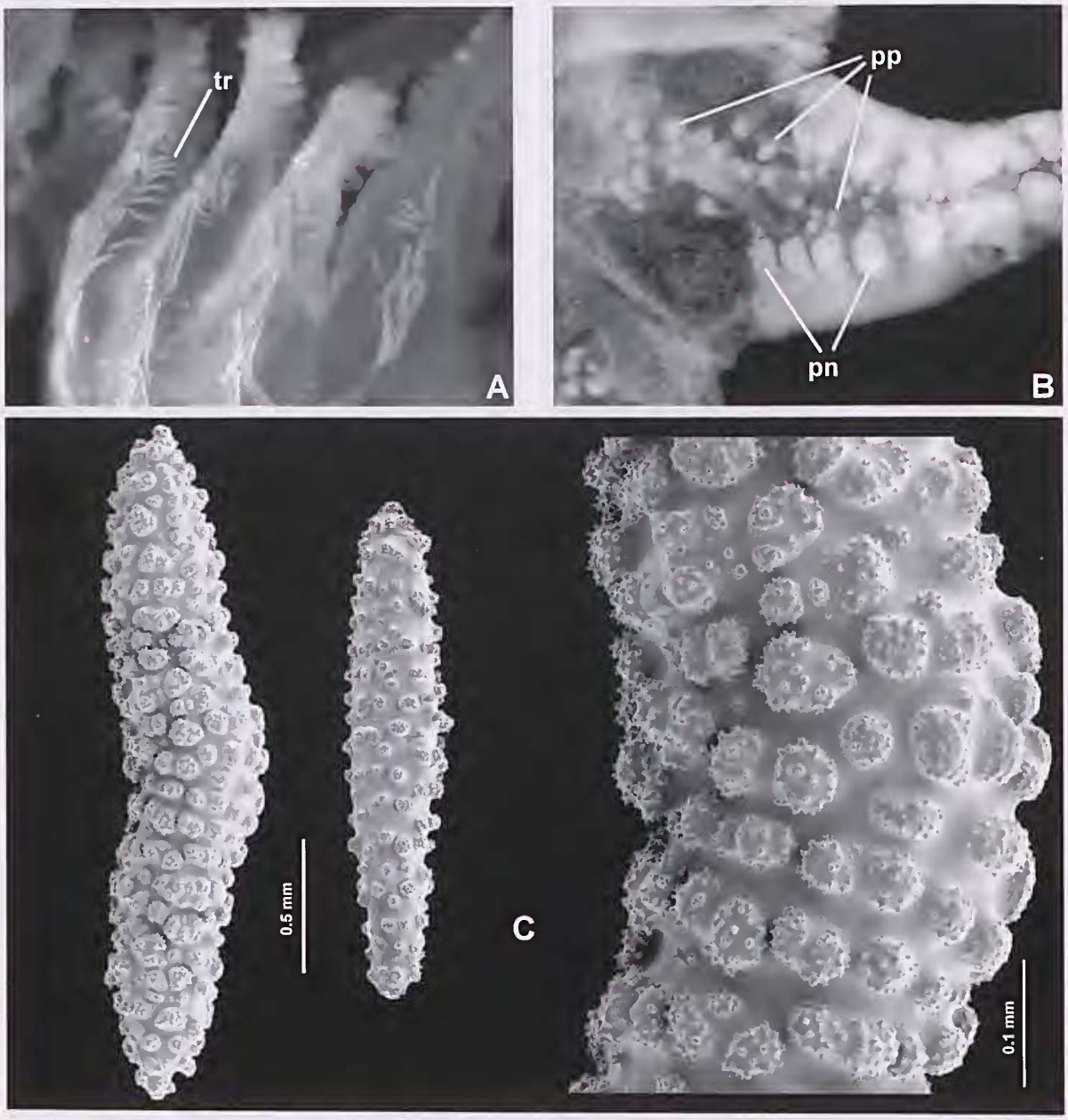

Fig. 2. *Elbeenus lauramartinae* n. gen, n. sp., holotype: **A**, polyp tentacles; **B**, oral surface of tentacle showing papillae; **C**, basal sclerites with sectional enlargement of the larger sclerite. Abbreviations: **pp** = papillae, **pn** = pinnules, **tr** = tentacular rods.

Fig. 3. *Elbeenus lauramartinae* n. gen., n. sp., holotype, polyps showing sclerite arrangements. Abbreviations: **sp** = supra-point sclerites, **tr** = tentacular rods.

the ornamentation on the inner surface of the sclerite being more complex than that on the outer surface. The interior of the colony also contains spindles, but these are very sparsely distributed in the walls of the wide gastric canals, and, with minimal dissection, seem to occur more towards the surface. These spindles can often be seen through the lobe surface and are generally quite isolated, but in few places they are quite numerous (Fig. 1C). They are smaller and thinner than the basal sclerites, up to 3.5 mm long and 0.15 mm thick, and the large tubercles only have small, angular, cone-like processes.

The majority of the polyps are contracted to such an extent that only the head projects from the coenenchyme, but a few have an extended neck region that may be up to 1.6 mm in length (Fig. 1G). In some polyps, the tentacles are folded in above the mouth, but in many they still protrude, though they are very short. A small proportion of polyp heads only partially protrude, while several others are completely retracted to just below the surface. Polyp heads are mostly about 2 mm in diameter, with the range being about 1.6–2.3 mm.

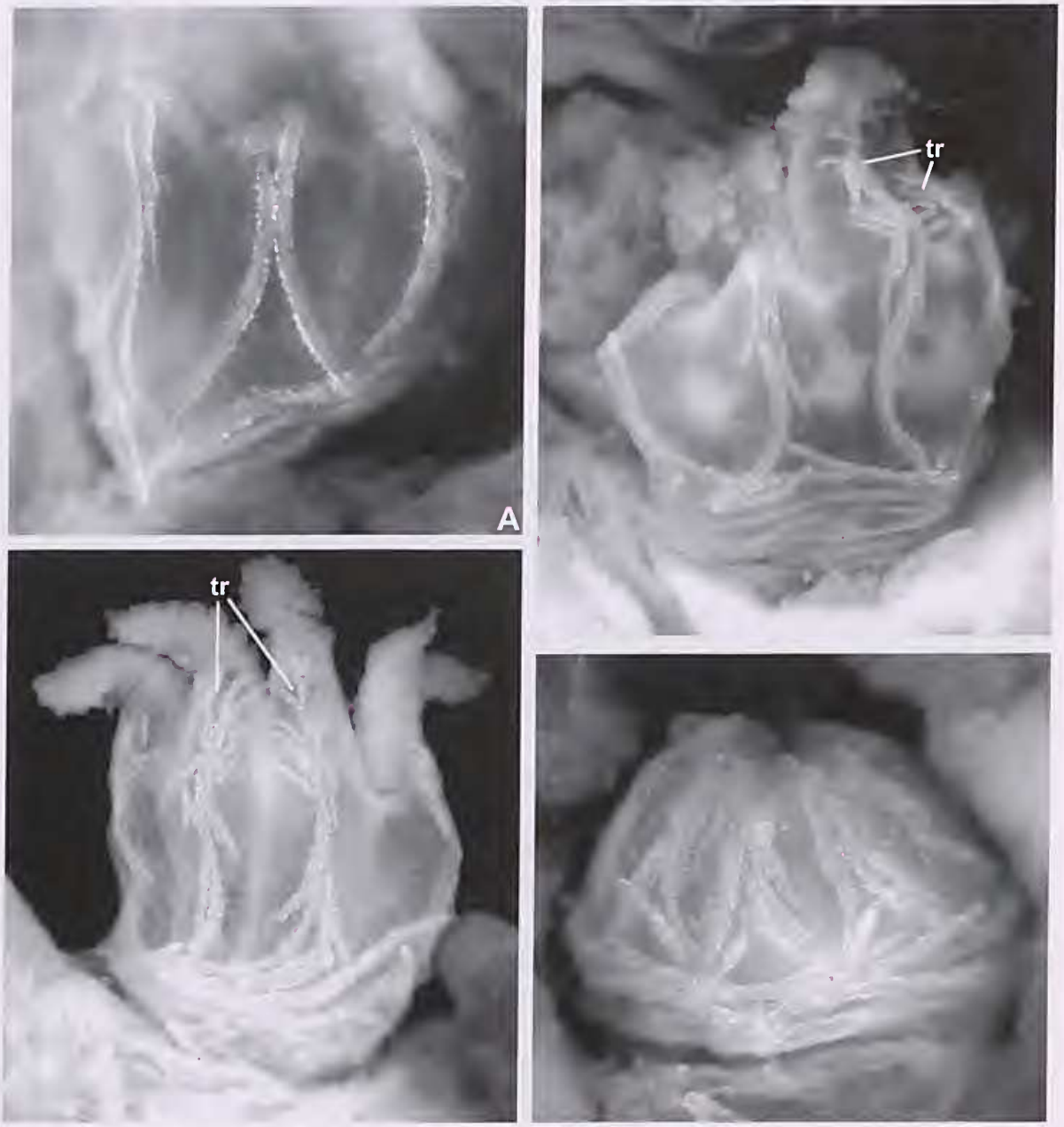

Fig. 4. *Elbeenus lauramartinae* n. gen., n. sp., holotype, polyps showing sclerite arrangements: A, point sclerites exceptionally long, no supra-points. Abbreviation: **tr** = tentacular rods.

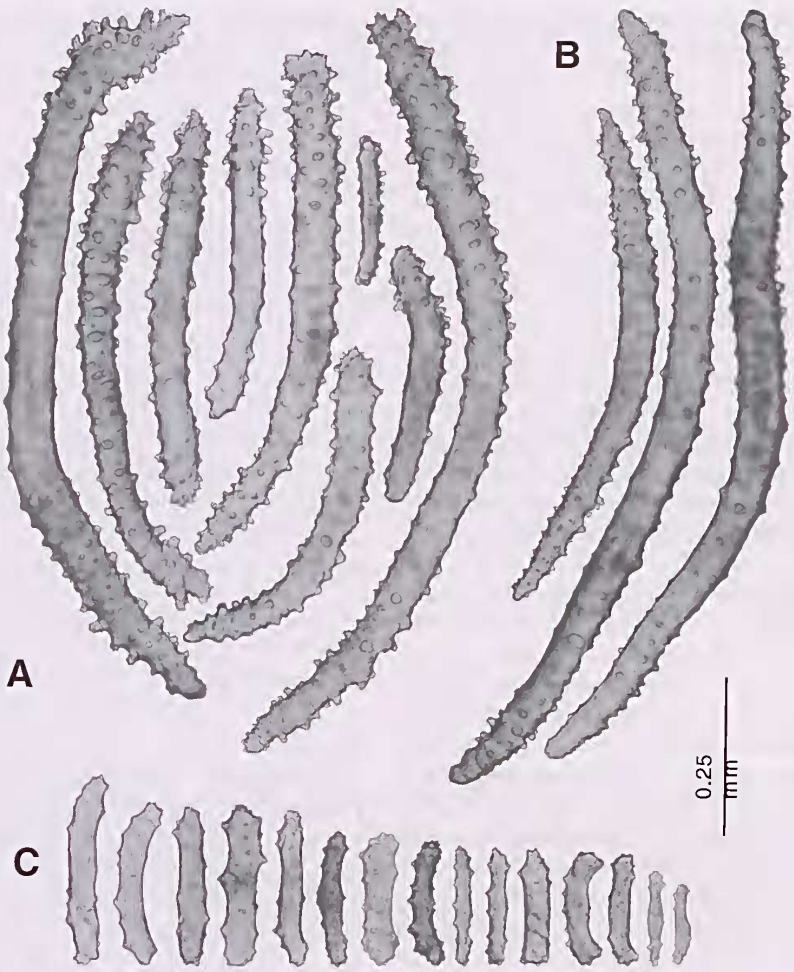

Fig. 5. *Elbeenus lauramartinae* n. gen., n. sp., holotype sclerites: **A**, points and supra-points; **B**, collaret; **C**, tentacular rods.

The tentacles have a single row of about 14–15 pinnules along each edge. Unusually, however, on the oral face there are scattered papillae (Fig. 2B), which are perhaps homologous to the structures described and figured by Kükenthal (1906b: 20 and pl.5, fig. 22) for the specimen he named *Xenia antarctica*.

The number and arrangement of the polyp sclerites is very variable (Figs 1G, 3, 4), and is not abaxially/adaxially symmetrical. On the abaxial face, the collaret consists of 1–3 (rarely 4) 'rows' of very thin, curved, spindles. These may be all short, all long, or a mixture, but no organised rows are present. On the adaxial face, the number and size of the collaret sclerites are reduced, and commonly there are none. The central region of a collaret sclerite is relatively smooth. The tubercles on the rest of the sclerite are usually cone-like or tooth-like, and may have a few prickles (Fig. 5B).

Above the collaret, on the abaxial face, lie the point sclerites. In simplest form, an octant may contain just a single, thin, spindle that may be curved or straight. More commonly there are two long, curved spindles, however, smaller additional sclerites may increase the number in an octant to about 5 (rarely 6). In some cases when there are only 2–3 curved sclerites in an octant, they may lie parallel to each other instead of the curves being opposed to form a chevron. The arrangement of the points is only left/right symmetrical when just two chevronned sclerites occur. On the adaxial face of the polyp the point sclerites are noticeably smaller and fewer, and often just a small, single spindle will occur in each octant.

Distal to the point sclerites, on the abaxial side of the polyp, there is commonly one or more longitudinally arranged supra-point spindles that bridge the distance to each tentacle base (Fig. 3). The proximal part of these short sclerites overlaps the distal part of the point sclerites. Sometimes, however, one or more point sclerites are exceptionally long and extend from the collaret to the tentacle base and no supra-points are present (Fig. 4A). The supra-point sclerites are not

visible if the tentacles have been folded in over the mouth. In the adaxial octants these sclerites are smaller or absent.

Like a collaret sclerite, a point and supra-point sclerite has a relatively smooth zone that is more or less centrally placed. The rest of the sclerite has somewhat jagged, cone-like or tooth-like tubercles (Fig. 5A).

In the rachis of each tentacle there are numerous rods (Figs 2–4), the proximal ones being much larger than the distal ones. In a relatively expanded tentacle, the proximal rods are arranged in two series, one on each side of the aboral face, forming irregular chevrons with the apex of the 'V' directed toward the polyp mouth. Distally, the smaller rods tend to lie transversally. In less expanded tentacles, all rods commonly lie transversally in a single row. In more contracted tentacles, the arrangement is disrupted and the proximal rods often appear grouped longitudinally. The arrangement and number of sclerites in both abaxial and adaxial tentacles seem to be much the same. The rods have a few cone-like tubercles (Fig. 5C).

When alive, the base of the colony was cream coloured, the lobe surface grey-blue, and the polyps a rich brown to reddish brown (L. Martin: field notes). The specimen in its preserved state is slightly paler, and the polyps are much paler.

Remarks. A second colony of the species was obtained about 100 metres from the first at about the same depth, but unfortunately only a photograph remains (Fig. 1B). This colony does not appear to have the same extent of sclerite-reinforced base as the holotype, the thickly clustered sclerites being restricted to the basal rim, at least on the side of the colony that appears in the photograph. This indicates that the basal reinforcement is variable and is probably only a response to local conditions. This second colony was browner overall than the holotype and most of its polyps were retracted. In the photograph the interior spindles can clearly be seen through the colony surface.

Etymology. I am delighted to name this species after Dr Laura Martin, Coral Reef Research Foundation, Palau, who collected the holotype while aboard the *DeepWorker* submersible.

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